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INTRA-INDUSTRY MOBILITY IN THE CANADIAN
MANUFACTURING SECTOR

by

John R. Baldwin¹ and Paul K. Gorecki²

No. 23B

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ABSTRACT

Firm turnover occurs both because of entry and exit and because of expansion and contraction in continuing firms. This paper develops measures of change in the incumbent population and compares them to the entry and exit process. In the first case, measures of employment growth and decline are used. Rates of change are measured both in the short and long run. Contrary to the case for entry and exit, where the annualized value of the long-run cumulative rates were about the same as the short-run rates, for continuing firms the short-run rates were much higher than the long-run rates. A larger percentage of short-run growth and decline in the continuing sector is transitory and is reversed in the long run. Nevertheless, over a ten year period, both entry and exit and continuing firm change lead to a substantial cumulative increase or decrease in employment. In addition to measures of rates of change, the dissimilarity index of market shares in 1970 and 1979 is used to capture the amount of change in relative firm position. This measure captures the extent to which market share is transferred from losers to winners. This index shows that about 16 percentage points of market share, on average, are transferred as a result of greenfield entry and closedown exit. Another 17 percentage points are transferred as a result of growth and decline in the continuing sector. At the 4-digit industry level, one-third of all market share on average is transferred by both turnover processes over a decade. Finally, the paper examines whether high levels of entry and exit turnover are associated with high levels of continuing firm turnover and asks whether one process is just an extension of the other. It finds no correlation between the two and concludes that the two measures capture different aspects of mobility.

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Introduction

Industrial economists have long used measures of market structure as indicators of the degree of competition in an industry. Most of these measures capture aspects of the firm size distribution. They describe the outward appearance of an industry; they do not measure what is going on inside it. While it has been recognized that there are shortcomings to standard concentration measures, there have been few systematic attempts to overcome these shortcomings and to measure the dynamics of changing relative firm size within industries. More recently, greater interest has been paid to this issue. Studies of entry and exit are more common in the literature.¹ Studies of change in the incumbent population are more difficult to find.

The entry and exit of entire firms account for only part of the turnover that transfers market share from one firm to another. Entry and exit occurs at the margin. Entry occurs at the beginning of a firm's history; exit at the end of its life. In the interim, infra-marginal change within the body of an industry occurs as incumbents grow and decline. In Baldwin and Gorecki (1990a), the importance of entry and exit to the Canadian manufacturing sector was described in detail. This paper outlines the amount and pattern of turnover in the incumbent firm population.

The amount of turnover can be expressed either in terms of the absolute expansion and contraction in firm size or in terms of relative change, such as shifts in market shares. In the first section, the pattern of change is examined using rates of growth and decline in firms defined at the level of the manufacturing sector as a whole;² in the second section, the amount of market share being shifted from those gaining to those losing relative position within a 4-digit manufacturing industry is examined.

An appreciation of the importance of the entry and exit process required a comparison of the difference between instantaneous and cumulative rates of change. Entrants, who were barely noticeable in the short run, reached a respectable size when the process was allowed to cumulate over time. Because important insights into the entry process were gained by

comparing the long and the short run, the same procedure is followed here. As was the case with the investigation of the importance of entry and exit, continuing firm turnover is first investigated at an aggregate level, where the firm is defined to encompass all manufacturing operations under common control. Then it is summarized at a less aggregated level, where the firm is defined to include just those operations in a particular 4-digit manufacturing industry.

The Rise and Fall of Firms in the Short Run

A) Annual Rates of Growth and Decline

In order to estimate the importance of the contribution that continuing firms make to turnover, the employment of manufacturing firms was compared in successive years from 1970 to 1982. Employment was measured for consolidated firms.³ Firms were divided on the basis of whether their employment grew, declined, or remained constant between adjacent years. Then the change in employment in each of the growing and declining sectors relative to total manufacturing employment in the base or initial year was used to measure the growth and decline rates.

Firm growth and decline within the continuing sector can arise from three separate sources. The first source is the expansion and contraction of existing establishments. The second is the opening and closing of plants. The third is due to acquisitions and divestitures of plants. The joint effect of all three is reported in Table 1.

The amount of underlying change within the continuing firm sector is considerably larger than year-to-year change in net employment would indicate. On average, net growth in continuing firms between 1970 and 1982 was about 1.5 per cent per year. But this was accompanied by an average annual gain in employment in expanding firms of 7.8 per cent and an average annual loss in contracting firms of some 6.3 per cent.

The annual rates of firm growth and decline, along with the net rate of change

Table 1

THE ANNUAL CHANGE IN EMPLOYMENT IN
EXPANDING AND CONTRACTING FIRMS IN
THE CANADIAN MANUFACTURING SECTOR
1970-81

Period	Net Change Incumbents	Expanding Incumbents	Contracting Incumbents
(per cent)			
1970-71	-0.91	5.19	6.10
1971-72	3.77	8.46	4.69
1972-73	5.43	9.36	3.93
1973-74	3.29	8.18	4.89
1974-75	-1.97	5.72	7.69
1975-76	0.97	6.67	5.80
1976-77	0.07	6.68	6.75
1977-78	3.39	8.95	5.56
1978-79	4.89	10.50	5.61
1979-80	-0.92	6.95	7.87
1980-81	7.51	13.38	5.87
1981-82	-7.01	3.59	10.60
Mean	1.53	7.80	6.28

Note: 1) An incumbent firm is one that owned at least one establishment in the manufacturing sector in both the initial and terminal year.

2) Changes in employment are calculated as a percentage of total manufacturing employment in the initial year.

derived from the two processes, are graphed in Figure 1. Both the expansion and contraction rates have a cyclical component, though the expansion rates have slightly more cyclical variability than the contraction rates.⁴

Despite this volatility, there is a component of both the expansion and contraction process that takes place despite the cycle and that reflects specific idiosyncratic effects which cause random yearly fluctuations in firm output. Even when expansion rates are at their peak, a good proportion of firms contract with non-negligible rates of decline. For example, there was strong economic growth in 1972-73. Over 65 per cent of firms expanded in that year at a average rate of 9.6 per cent; nevertheless, in this same year, 34 per cent of the firm population declined and the average rate of contraction of these firms was 4 per cent. Short-run contraction and expansion then are not just functions of overall cyclical conditions. There is a process at work that constantly leads to the expansion of some firms and the contraction of others.

The growth and decline of incumbents leads to considerably more short-run churning than did entry and exit. Figure 2 depicts the relative size of the two sources of growth and decline in the short run. It compares the average annual expansion rate of continuing firms to the average annual greenfield and acquisition entry rates⁵ for the period 1970-81; and the average annual contraction rate in continuing firms to the average annual closedown and divestiture exit rates⁶. Rates of growth due to expansion are about eight times the rates of either entry category. Rates of continuing firm contraction also dominate exit rates in the short run.

The annual expansion and contraction rates may mask considerable variability in the underlying process. The rate of employment change depends upon the proportion of firms in a category, the change in employment of firms in this group, and the average size of firms in this category. For example, the expansion rate in growing firms is defined:

$$G = (\text{employment expansion}) / (\text{total employment})$$

Contraction and Expansion Rates in Continuing Firms in the Manufacturing Sector : 1970-1981

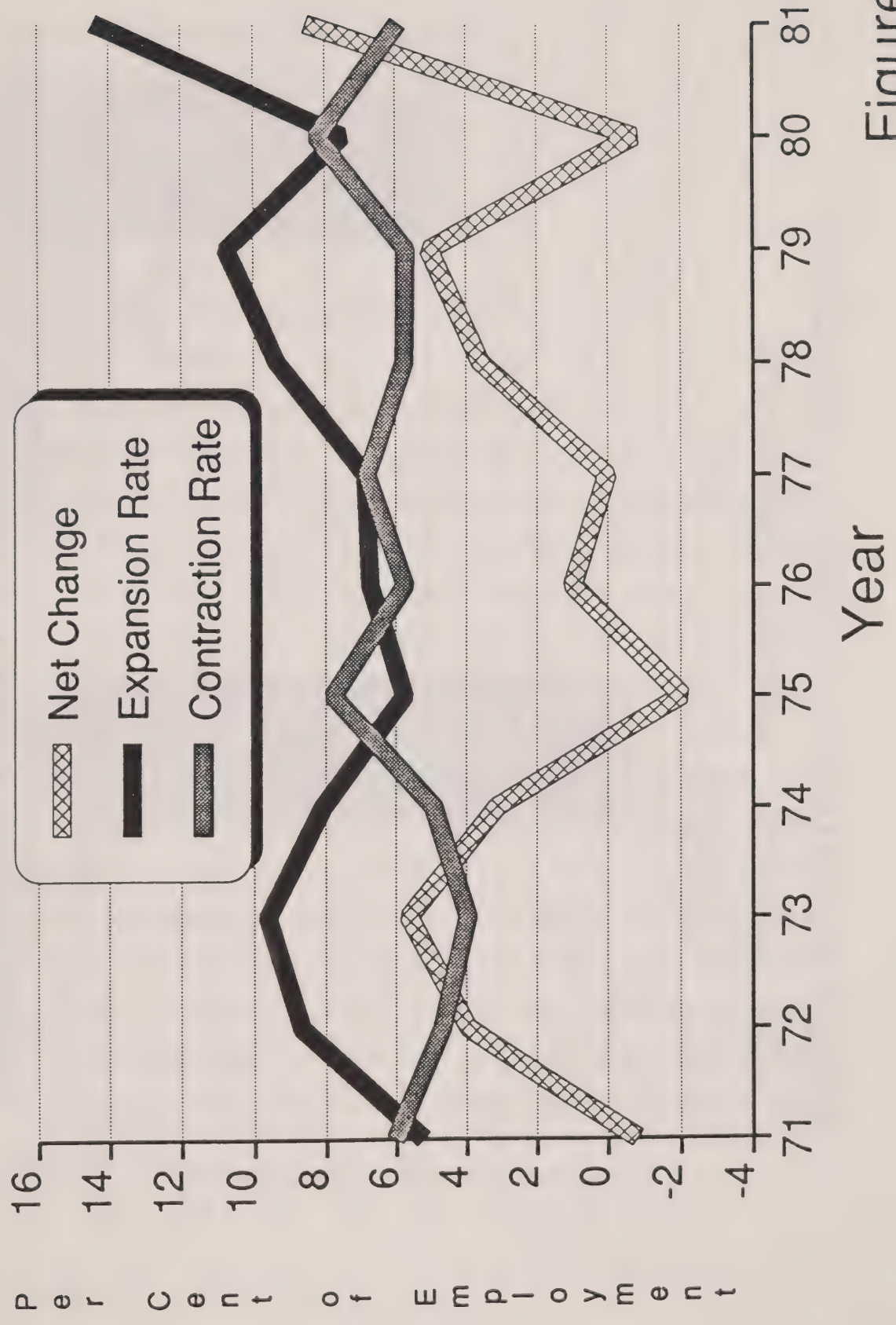
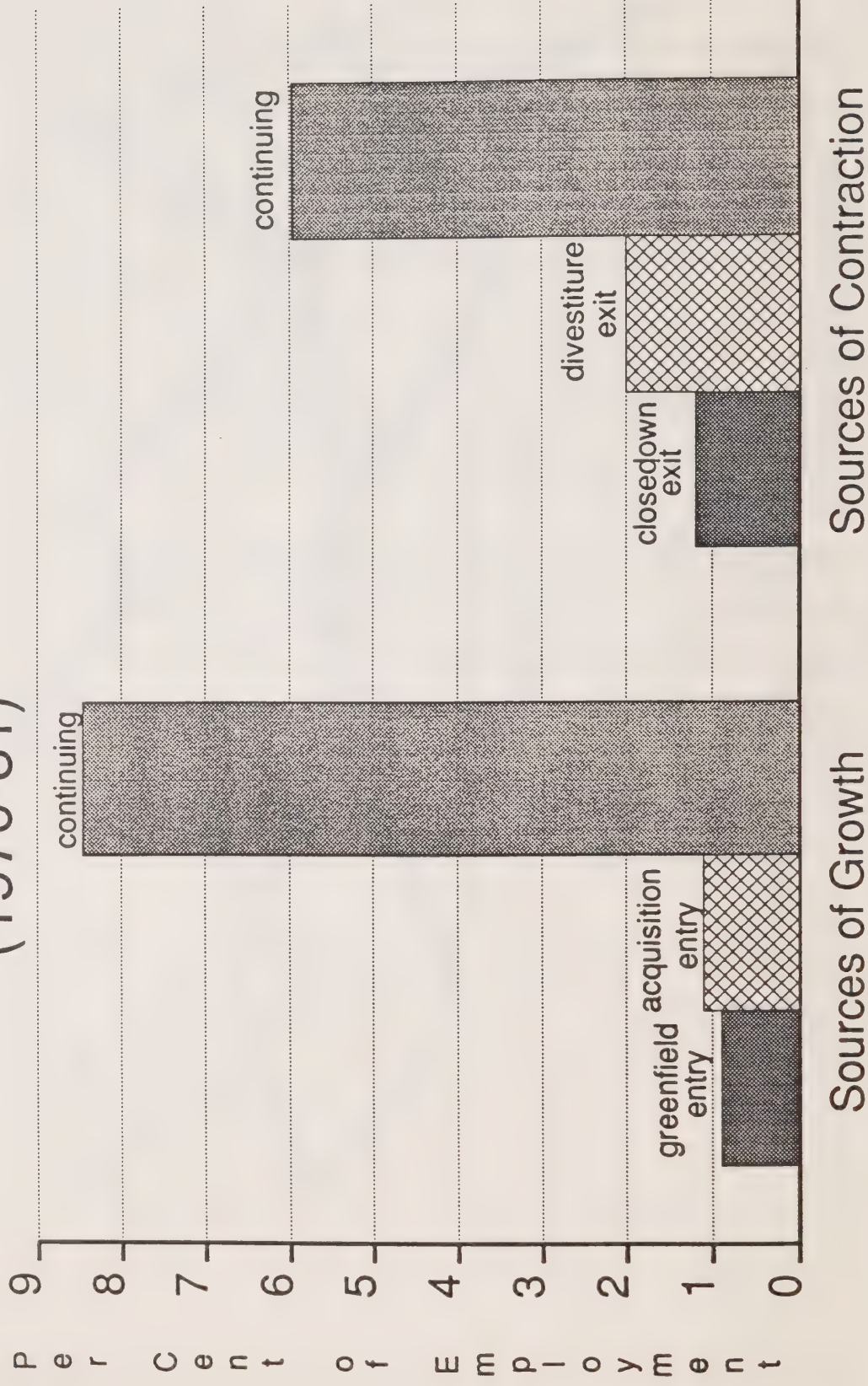


Figure 1

Rates of Expansion and Contraction

By Source : annual averages (1970-81)



and can be identically written as

$$G = (\text{number of firms growing}) * (\text{average expansion}) / \\ (\text{total number of firms}) * (\text{average size of all firms}).$$

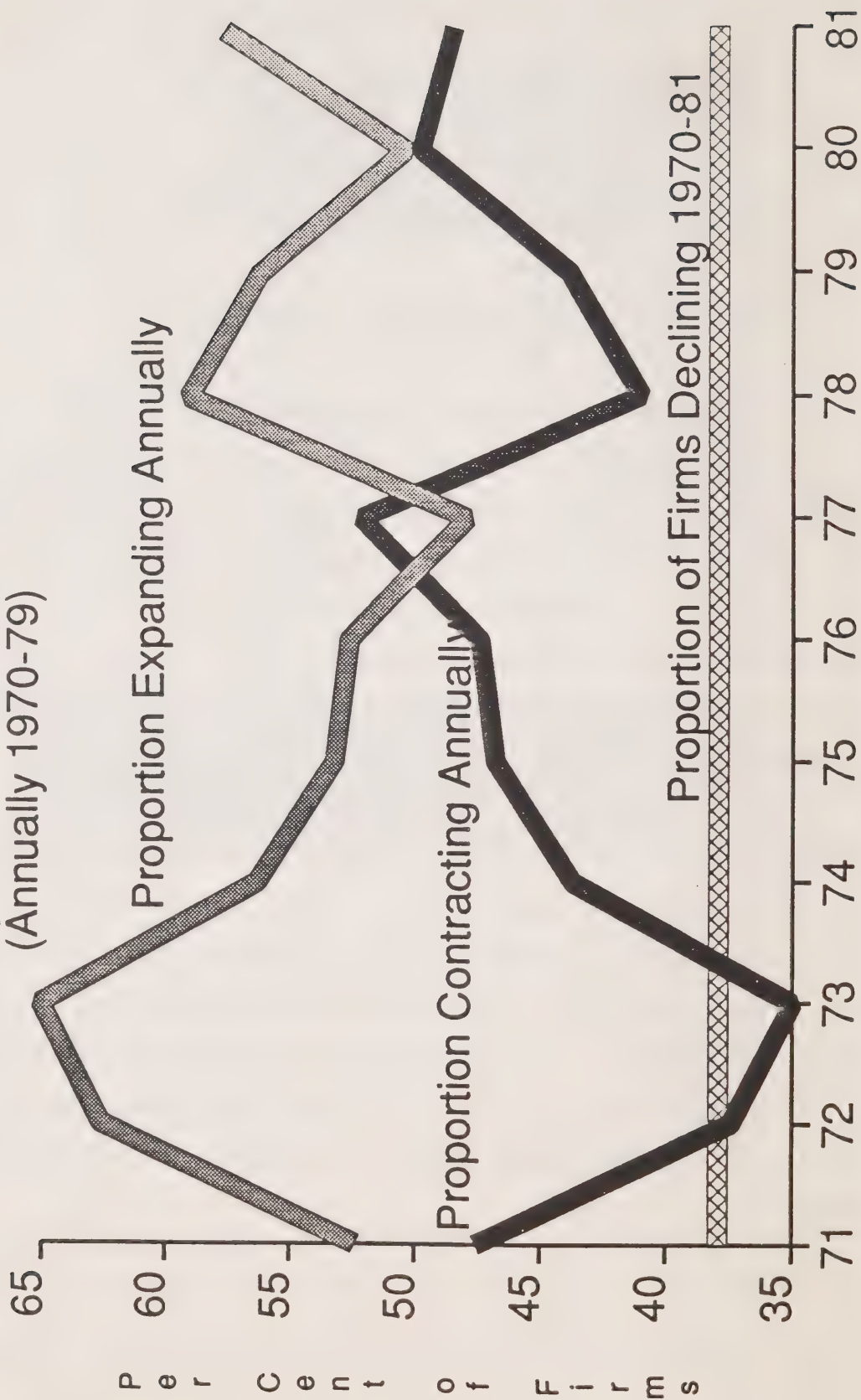
or

$$G = (\text{number of firms growing}) / (\text{total number of firms}) \\ \text{times} \\ (\text{average expansion}) / (\text{average size of those growing}) \\ \text{times} \\ (\text{average size of those growing}) / (\text{average firm size of all firms}).$$

In order to investigate the characteristics of the process further, just those firms with a change in employment were chosen. The proportions of the number of these firms that expanded and that contracted in each of the years from 1970-1981 are presented in Figure 3. Also included is the proportion that had lower employment in 1981 than in 1970. The latter represents the proportion of firms in long-run decline. It should provide a lower bound on the annual contraction rates since the latter will contain some firms that are only temporarily experiencing difficulties.

Cyclical transitory factors dominate short-run results. Firms that increase employment one year tend to reverse direction the following year. Therefore, it is not surprising that, in the short run, growing and declining firms are split quite evenly. On average, 55.2 per cent of all firms expanded on a year-to-year basis; 44.8 per cent contracted. The percentages of firms in long-run decline can be derived from comparing the employment status of firms over longer periods -- 1970 to 1976; and 1970 to 1981. Over the longer periods, the percentage of firms declining is still substantial -- 37.1 and 37.9 per cent for each of these periods. These are close to the proportions that characterize short-run decline during years of rapid expansion -- 1973 and 1978.

The Proportion of Firms with Employment Change that Expand and Contract (Annually 1970-79)



Year

B) Regression Toward the Mean in the Short and the Long Run

While the size of the growth and decline process indicate that turnover is large, its significance to the competitive process is revealed by the patterns that emerge. One is the extent to which short-run change can also be found in the long run. Another is the tendency of large firms to decline and of small firms to grow -- the regression to the mean phenomenon.

Both aspects can be found in characteristics of the growth and decline process described in more detail in Table 2. It contains the average annual rates of employment change, the average annual employment change, and the average size of the firm for each of the expanding and contracting classes for the years 1970-81. In addition, data for the same variables are reported for the longer periods 1970-76, and 1970-81.

The short-run data show a remarkable symmetry in the annual growth and decline process. Expanding firms increased employment by 16.4 per cent on average; declining firms contracted by 13.6 per cent on average. Expanding firms grew by 19.8 employees on average; contracting firms declined by 17.3 employees on average. These minor differences between the annual growth and decline processes are due to the asymmetry of the merger and plant creation process. When the same statistics are calculated for growing and declining establishments, as opposed to firms, the average annual amount of growth and decline was equal -- 13.6 and 13.4 employees respectively.⁷

The nature of the change in relative position of firms is evident when the average size of a declining firm is compared to the average size of an expanding firm. If annual data from 1970 to 1981 are used for measurement, the average size of a firm in decline was 129 employees and the average size of a firm that expanded was 120 employees. Thus, even in the short run, there is a regression towards the mean phenomenon.

In the longer periods 1970-76 and 1970-81, the expansion and contraction processes are less symmetric. Firms that had lower employment in 1981 than 1970 lost 51 employees

Table 2

CHARACTERISTICS OF EXPANDING
AND CONTRACTING INCUMBENT FIRMS
IN THE CANADIAN MANUFACTURING
SECTOR: 1970-81
(measured in employment)

Year	Expanding Firms			Contracting Firms		
	Average Rate of Change	Average Change	Average Size	Average Rate of Change	Average Change	Average Size
Annual Comparisons						
1970-71	12.6	13.0	103.3	11.2	16.8	149.5
1971-72	15.6	16.9	107.9	11.6	15.6	135.2
1972-73	13.9	18.4	132.4	14.2	14.3	100.7
1973-74	14.3	20.0	140.4	13.7	15.5	112.8
1974-75	15.0	13.8	91.6	13.4	21.0	156.5
1975-76	14.2	16.3	114.4	12.0	15.7	131.5
1976-77	15.1	18.6	122.9	13.3	17.3	130.2
1977-78	16.4	21.0	127.7	14.8	18.7	127.0
1978-79	18.0	24.5	136.4	15.9	16.8	105.6
1979-80	16.3	19.3	117.9	15.5	22.0	141.8
1980-81	28.6	35.7	125.1	13.6	16.7	122.8
Mean	16.4	19.8	120.0	13.6	17.3	128.5
Longer Run Comparisons						
1970-76	44.3	41.9	94.4	24.2	38.9	161.3
1970-81	73.5	77.3	105.2	31.9	51.3	160.6

- Note: 1) All statistics were calculated using employment of consolidated manufacturing firms.
 2) The rate of change is calculated as the growth divided by employment in just those firms growing or the contraction divided by employment in contracting firms
 3) Average size is measured as of the initial year.

on average; firms that grew expanded by some 77 employees. The asymmetry is not as important as the fact that the expansion and contraction rates are considerably greater than for the short run. Not only do a third of the firms contract over the longer periods but the amount of contraction is substantial. This means that turnover, when measured over longer periods, leads to substantial change in relative firm position. The long run is not the same as the short run. The magnitude of the structural shift in relative firm position is greater in the longer run.

The difference between the average size of the gainers and losers increases when the longer periods (1970-76 and 1970-81) are used. Although the average size difference was only 9 employees when annual data are used, it increased to over 50 employees in each of these two longer periods respectively. The regression towards the mean process is more than just a short-run phenomenon. What is present in the year-to-year data is even more visible when longer periods are compared. The turnover process causes the largest firms to decline and the smallest to grow.

More important than the existence of a size regression phenomenon is its magnitude. The percentage change in average firm size in each of the declining and growing sectors is large. The cumulative rates of growth and decline between 1970 and 1981 were 77 and 31 per cent respectively. More importantly, the magnitude of the change caused the relative mean size of the two groups to change. Contracting firms declined from an average size of 161 to 109 employees; expanding firms grew from 105 employees to 183 employees on average. This is a dramatic change in the relative average size of the two groups and one that indicates the magnitude of the structural shifts in relative firm size that occurred.

In the short run then, the proportion of firms that grow and decline is relatively similar, and the amount of employment change is small -- some 17 to 20 employees on average. The stochastic process at work here would not have had a great impact on relative firm rankings. The long-run changes, however, indicate that the process at work contains more than a transitory component. Research showing that rates of growth are negatively

correlated can all too easily be interpreted to mean that all short-run change is reversed in the long run.

This is incorrect. More than a third of firms declined over the period from 1970 to 1981. In 1970, these firms were on average some fifty per cent larger than those who subsequently expanded over the same period. The amount of growth and decline was large enough to change the average relative size of the two groups by 1981.

Long-run Rates of Change in Firm Size

Expansion and contraction in incumbents dominates the entry and exit process in the short run. Whether it does so in the long run depends upon whether the short-run rates are sustained in the longer run. While the annualized values of the decadal entry and exit rates in the 1970s are virtually the same as the short-run rates,⁸ there is no reason to expect short- and long-run rates in the continuing firm sector to be the same. Indeed the short-run situation, where about half of firms decline or grow with rates of change of 6 to 8 per cent, is unlikely to be sustainable in the longer run without the type of rapid and dramatic reversals in firm relative position that are rarely observed. Several other studies of the annual growth rates of firms suggest that the short-run fortunes of continuing firms are reversed fairly quickly (Hall, 1987; Leonard, 1987). As has been previously demonstrated, the predominance of annual reversals need not imply that little long-run change is taking place. This section presents additional evidence that cumulative growth and decline over a decade is substantial.

In order to contrast the relative importance of change in the continuing firm sector in the short and the long run, the status of manufacturing firms was compared in 1970 to 1976, in 1975 to 1981, and in 1970 to 1981. The rates of employment change for growing and declining firms are reported in Table 3. Three sets of results are tabulated. Panel A contains the cumulative rate of change obtained from comparing the employment of firms

Table 3

CUMULATIVE GROWTH AND DECLINE RATES
FOR EXPANDING AND CONTRACTING FIRMS
IN CANADIAN MANUFACTURING
BETWEEN 1970 AND 1981
(%)

Period	Expansion Rate	Contraction Rate
Panel A Cumulative Change from comparing endpoints		
1970-76	19.06	10.47
1975-81	23.14	10.41
1970-81	27.21	11.00
Panel B Implicit Annual Rates of change from panel A		
1970-76	2.95	1.83
1975-81	3.53	1.82
1970-81	2.21	1.05
Panel C Average of annual rates within each period		
1970-76	7.26	5.52
1975-81	8.86	6.24
1970-81	8.18	5.89

NOTE: 1) The expansion and contraction rates are calculated as the difference in total employment between initial and terminal year divided by total base year employment.
2) The average of the annual rates are slightly different than would be obtained from Table 1. For an explanation, see Baldwin and Gorecki (1989b)

at the beginning and end of each period. Panel B contains the equivalent annual rates derived from these cumulative rates of change.⁹ Panel C contains the average annual rates derived from the year-to-year changes calculated within each period.

The year-to-year growth and decline rates for continuing firms are considerably greater than the rates calculated for firms that grew or declined over the longer periods, as can be seen from comparing Panel C to Panel B in Table 3. For example, the yearly decline rates were between 5 and 6 per cent for each of the five-year periods; the equivalent annual long-run decline rate was only about 1.8 per cent for each of these periods. The yearly growth rates were between 7 and 9 per cent for each of the five-year periods; the equivalent annual long-run growth rate was between 3 and 4 per cent for each of these periods. Substantial reversals in the fortunes of continuing firms took place.

While continuing firm expansion and contraction dominate the churning that takes place in the short run, as was demonstrated in Figure 2, this is no longer the case for the decadal comparison. Because of the decline in the long-run expansion and contraction rates from their high short-run values, and the maintenance of the longer-run entry and exit rates at their short-run values, the two processes about equally important in the long run. Over the period 1970-1981, the equivalent annual expansion rate for incumbents was 2.2 per cent; the equivalent annual entry rate from both acquisition and greenfield entry was 2.1 per cent. The equivalent annual contraction rate was 1.0 per cent; the equivalent annual closedown exit rate was 1.0 per cent.

Just as important as the relative magnitude of the two processes is their cumulative effect. Figure 4 is a bar chart depicting the total cumulative contribution made to employment by firm expansion and the two forms of firm entry; contraction, and the two forms of firm exit between the years 1970 and 1981. Greenfield entry added 10.9 per cent, acquisition entry affected 14.6 per cent, and expansion in the continuing sector added 27.2 per cent to 1970 employment. Closedown exits led to a disappearance of 10.5 per cent of 1970 employment, divestitures affected 17.7 per cent of employment, and employment

Rates of Expansion and Contraction By Source : cumulative (1970-81)

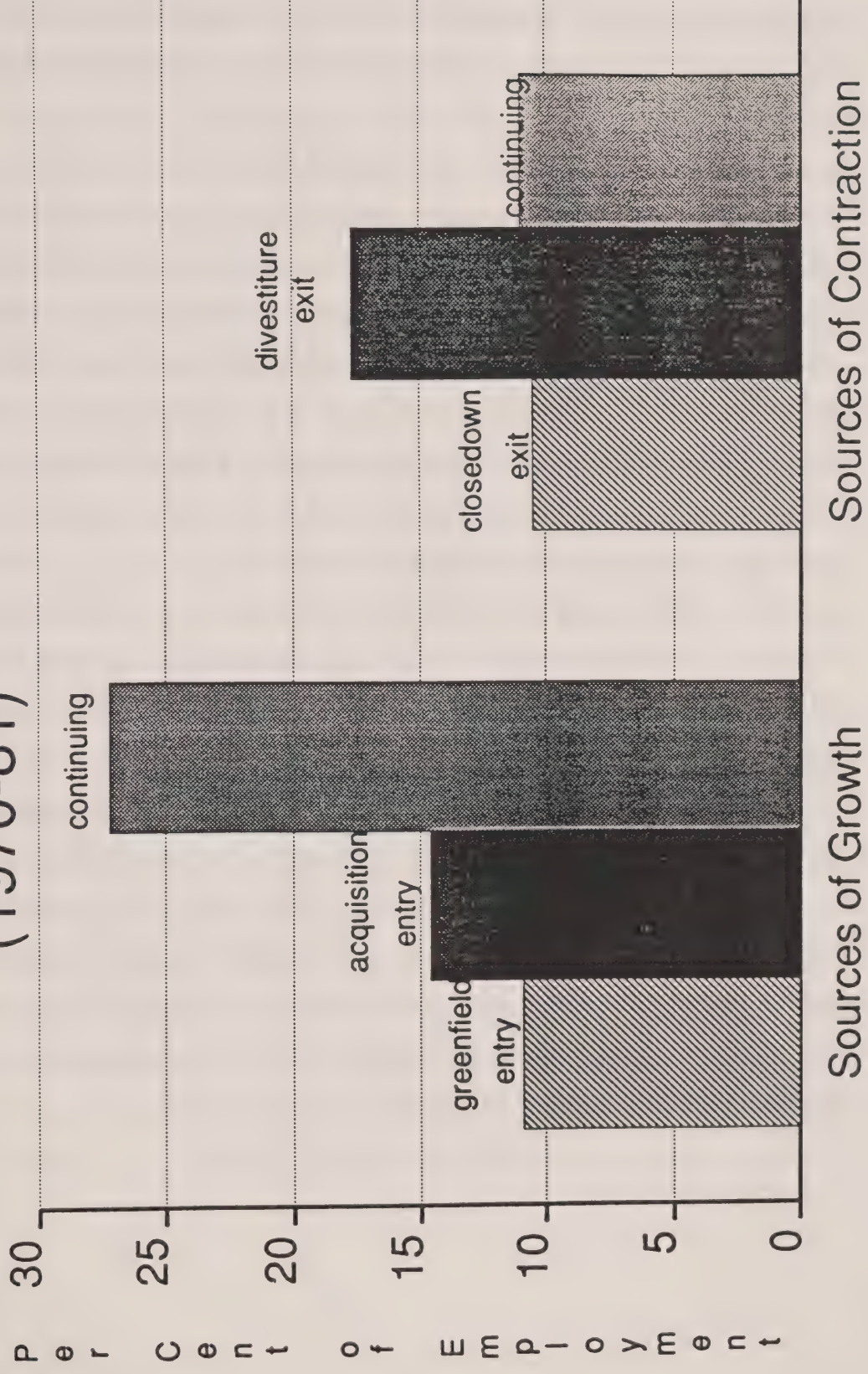


Figure 4

contracted in declining firms by an amount equal to 11.0 per cent of initial total employment in all firms. While it is true that short-run changes in firm size are mainly transitory, there is nevertheless a large subset of firms that contracted and the cumulative change in these firms was substantial. Combined with the fact that some firms also experienced substantial growth, this meant the relative size of firms in each group reversed itself during the decade of the 1970s.

The differences between the short- and the long-run results provide a fundamental insight into the nature of the growth and decline process.¹⁰ Just as there are opposing views of the importance of entry and exit, there are two different views of the extent to which growth and decline in the continuing sector matters. The first is that most change therein is transitory: large firms remain large and small firms remain small, except for minor perturbations in their relative shares. The second is the Marshallian view that the growth and decline of firms is important. In this view, the life and death of firms is likened to that of trees in a forest. While birth, maturation and death are common, the outward appearance of the forest remains unchanged to the casual observer.

In the first view, the cumulative long-run results would be the same as the short-run results. That this is not the case supports the Marshallian view. More support for the latter position is provided by the regression to the mean phenomenon. The difference in the average size of declining and growing firms might be expected under either view. If change in continuing firms is regarded primarily as transitory, except for small marginal firms that are apt to exit when they decline, then the average size of a contracting firm will go up over time as the marginal firms are removed. But this view is not compatible with the considerable increase in the average amount of contraction in the long run, nor with the change in the relative position of expanding and contracting firms. The evidence on this aspect of change would support the position that there is considerable expansion and contraction across the firm size distribution.

Turnover as Measured by Share Changes

Rates of growth and decline, as outlined above, show the extent to which absolute firm size changes are taking place in the population of firms. However, they are not ideally suited for capturing the amount of relative size change for several reasons. First, they utilize employment measured at the consolidated firm level. Some of the expansion and contraction measured at this level may come from change in the relative size of industries within which these firms are operating. Elsewhere, we have demonstrated that most change comes from intra-industry rather than from inter-industry shifts.¹¹ Therefore, aggregate firm analysis provides useful information on the extent of intra-industry change. Despite this, analysis at an industry level is required to show what is happening to relative firm size within more narrowly defined markets.¹² Second, in an economy that is growing rapidly, only a few firms may decline in absolute size but there may be substantial changes in relative firm position. Varying rates of positive growth will lead to changes in the rankings of firms within an industry. Discussions of the strength of the competitive process generally have in mind a measure of relative change in market share for evaluating the extent to which some firms supplant others in the struggle for dominance.

To measure change in market share, data at the level of the individual 4-digit Canadian manufacturing industry were used and shares of firms in 1970 and 1979 were compared. The concept of a firm used in this analysis is the unconsolidated enterprise -- consisting of all establishments in a 4-digit manufacturing industry under common control.¹³ Share changes are defined in terms of industry shipments.

The index that is used to measure market share change is a dissimilarity index of firm shares between two periods for each firm in the industry.¹⁴ It is defined as one-half the sum of the absolute value of the 1979 share minus the 1970 share for all firms in an industry. This measure captures the market share that is transferred from those firms that are declining to those that are growing in relative importance. It varies from 0 to 100 and,

therefore, provides a metric in which the amount or severity of change can be readily measured.

Since the relative size of market share turnover due to entry and exit as opposed to continuing firm expansion and contraction is of interest, three values of the dissimilarity index were calculated. The first captures the amount of market¹⁵ share transfer that is due to entry and exit of firms; the second measures the amount of share transfer within the continuing firm sector alone; the third takes account of all share changes -- for both continuing firms as well as for entrants and exits. The mean values of each of these indices, calculated across 167 4-digit manufacturing industries, are presented in Table 4.

Two variants of the index are provided. The first includes only greenfield entry and closedown exit in calculations of the share transfer due to entry and exit.¹⁶ The second also includes entry by acquisition and exit by divestiture in the market share transfer due to entry and exit.¹⁷ Entry by acquisition and exit by divestiture are treated differently in each of these two calculations since there are legitimate differences of opinion as to the importance of these events. On the one hand, these events change the ownership of the firm and new owners may institute new policies and, thus, be regarded as a new force. On the other hand, ownership change may not involve any modification in the operating entity and its policies -- only a change in the legal entity. Since, a priori, there is uncertainty as to the appropriate treatment that should be accorded this form of entry and exit, the share turnover measure was calculated twice -- once with acquisition and divestiture included as entry and exit; once with it being excluded.¹⁸

In the long run, the amount of share change from all sources is substantial. Consider first the values of the index when entry and exit by acquisition and divestiture are excluded. Greenfield entry and closedown exit led to an average of 16 points of market share being shifted from declining to growing firms over the decade. About the same market share -- some 17 points -- was transferred as continuing firms changed relative position. The total shift of 33 percentage points is one-third of the maximum.

Table 4

AVERAGE SHARE CHANGE DUE TO TURNOVER OF
ENTRANTS, EXITS, AND CONTINUING FIRMS
OVER THE PERIOD 1970-1979

(per cent of total shipments)

Cause of Turnover	Entry and Exit due to acquisition omitted ¹	Entry and Exit due to acquisition included
Entry and Exit ²	16	29
Growth and Decline in Incumbents ³	17	12
Total	33	41

- Notes:
- 1) For the first column, all firms that were acquired or divested were treated as continuing during the decade and share changes therein included in row 2; in the second column, these firms are treated as entrants and exits and included in row 1 as described in note 2.
 - 2) Share change is calculated as one-half the sum of entry plus exit for each industry and then averaged across 167 4-digit manufacturing industries.
 - 3) Share change is one-half the sum of the absolute value of the difference between the shares of all continuing firms measured in 1970 and 1979.

When acquisition entry and divestiture exit are considered as entry and exit, the amount of share transfer due to entry and exit almost doubled -- from 16 to 29 per cent. This doubling accords with the finding reported in Baldwin and Gorecki (1990a) that the two forms of entry and exit were about equally important over the decade of the 1970s. In total, 41 per cent of market share was shifted from one group of firms to another when acquisition entry and divestiture exit are included in the total.

Size Class and Market Share Changes

Turnover is often regarded as unimportant either because it is not viewed as being very large or because it is seen to affect mainly small firms at the margin of the industry. It has been demonstrated here that the first view is incorrect; total turnover from both entry and continuing firm expansion and contraction is quantitatively important. The validity of the second view has only partially been addressed. The presence of entrants across a range of size classes demonstrates that entry is not restricted to just small and marginally insignificant industries.¹⁹ This section asks whether the distribution of the growth and decline process within the continuing firm population is also relatively widespread.

In order to examine the extent to which continuing firm share change differs across size classes, firms in each 4-digit industry as of 1970 were divided into five equal size groups based on a ranking of shipments. Then firms in each of the five quintile groups were divided into those whose share increased and decreased between 1970 and 1979. The importance of share change between 1970 and 1979 for firms in each industry was calculated as the ratio of the mean share increase or decrease in each group divided by the mean 1970 share of the group that increased or decreased -- giving the mean percentage share change. The means of these ratios across 167 industries are presented in Table 5.

The mean percentage share change, whether for gainers or losers, decreases across size classes. For the smallest size class, the mean share gain was 166 per cent. It was 39

Table 5

MARKET SHARE CHANGES
ACROSS SIZE CLASSES

Size Class	Mean Ratio of Share Change to Mean 1970 Share		Ratio of Mean Share Gained to Mean Share Lost	Ratio of Mean Shares of Gainers to Mean Share of Losers as of 1970
	Small to Large	Gainers Losers		
1	1.66 (.13)	-.49 (.01)	3.97	1.26
2	1.10 (.09)	-.43 (.01)	2.42	0.96
3	0.85 (.07)	-.40 (.01)	1.26	0.73
4	0.62 (.05)	-.37 (.01)	1.04	0.87
5	0.39 (.03)	-.35 (.01)	0.49	0.54

Notes: 1) The means are taken across 167 4-digit manufacturing industries.
 2) Share change is measured between 1970 and 1979.
 3) For the purpose of this table, firms acquired by entrants and divested by exiting firms are treated as continuing.

per cent for the largest quintile group. For the smallest size class, the mean share loss was 49 per cent. It was 35 per cent in the largest quintile group. While the percentage share change in the largest size class was less than the smallest, large firms experience significant percentage changes in market share.

Table 5 (column 3) also includes a variable that measures the ratio of growth and decline in each size class. It is the total share gains divided by the total share losses for each quintile group. For all size classes but the largest group, more market share was gained than lost. In the largest size class, about twice as much was lost as was gained. The tendency for small firms to grow and large firms to decline was observed in the rate of employment change data. Firms that declined in absolute terms were larger on average than those growing. Here, a similar regression toward the mean phenomenon was observed for market share gains as opposed to losses.

The same regression process can be seen in the difference between the initial year (1970) shares of each quintile for those that eventually gained market share and those that lost market share. The mean ratio of the shares in the opening year of those gaining to those losing share over the subsequent ten years is given in column 4 of Table 5. The percentage of 1970 market share in gainers declines as the size class increases until by the largest size class, firms that experienced subsequent market share increases have only about half the market share of those about to experience a loss in market share. The smallest size classes then have a relatively large percentage of their share in firms that subsequently grow in relative terms; the larger classes are about equally split between the two. Once more, this is indicative of relatively more dynamism in the smaller size classes.

In conclusion, when turnover data by size class is examined, it is apparent that there is relatively more growth in smaller classes and more decline in the largest classes. Despite this differential, the data show that change across all size classes is substantial.

A Comparison of the Sources of Market Share Turnover

Turnover occurs at the margin of an industry because of entry and exit and within the body of the firm size distribution because of the growth and decline of incumbents. When measured at yearly intervals, most turnover comes from the continuing sector. But as a longer time period is adopted, the entering and exiting sector increases its cumulative importance. Those continuing firms in long-term decline exit, thereby increasing the importance of the latter category. Entrants which start at a relatively small size begin to grow.

The previous section has shown that, in general, there is turnover in market share due to both entry and exit as well as incumbent growth and decline across 167 4-digit industries. In this section, the relationship between the two measures in a cross-section of industries is examined. This once again serves to place the entry and exit process in context of the change that is taking place in the continuing firm population.

While the amount of turnover that occurs from both sources is sufficiently large that neither can be dismissed, it is nevertheless important to ask whether they both capture the same phenomenon -- whether the same industry characteristics determine whether there is significant marginal and infra-marginal change. If they do, either can be used to rank industries on the basis of the amount of mobility they exhibit. If they do not, then analyses of market dynamics need to consider more than one aspect of intra-industry change.

It would not be surprising to find that the two processes were manifestations of the same forces. Where decline occurs in the short run, exit is probable in the longer run. As firms contract, they begin to exit. Where there is a large amount of incumbent growth, there is likely to be room for entrants to grow.

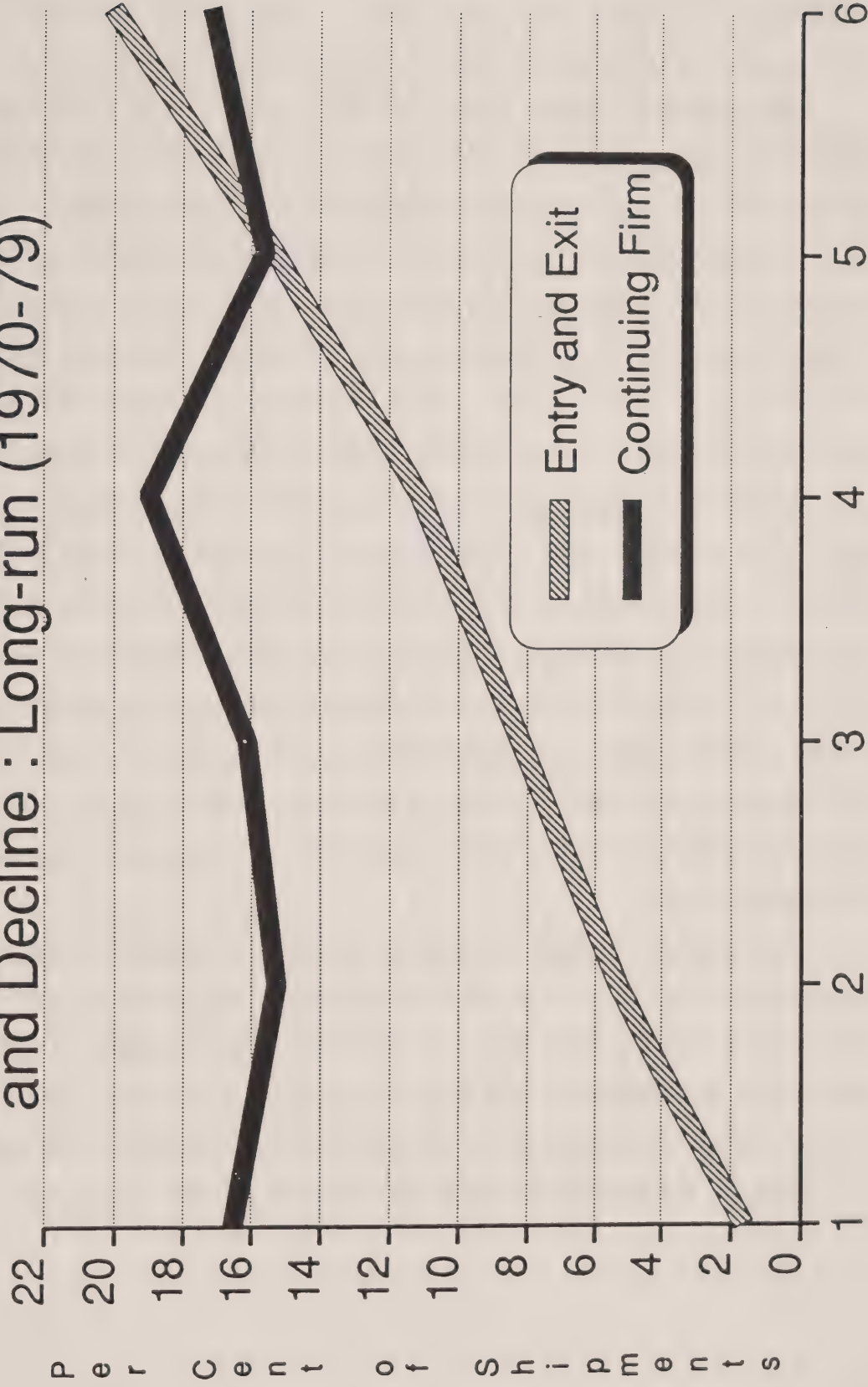
In order to assess the relationship between the two sources of turnover, the long-run change data derived from a comparison of 1970 and 1979 firm market shares were used. Short-run changes in market share derived from annual comparisons were not used because

the transitory change for the continuing sector tends to dominate long-run share changes when annual data are used. The measure of change used is the dissimilarity index -- one half the sum of the entry and exit shares or one half the sum of the absolute value of the changes in the shares of continuing firms. The entry and exit shares include only greenfield entry and closedown exit.

The two measures were correlated across the 167 4-digit Canadian manufacturing industries. The correlation coefficient was $-.006$ and was insignificant. Figure 5 provides a graphical depiction of the relationship between the two measures. All industries were ranked on the basis of the entry and exit turnover measure, then grouped into six equal size classes on the basis of this measure. Then the average turnover measure for entry and exit as opposed to that for incumbents was calculated for each group. In Figure 5, the averages for each group are plotted from left to right in ascending order of importance of entry and exit turnover. It is evident that turnover from incumbents is not closely related to that from entry and exit. While entry and exit turnover varied from a low of about 2 per cent in the first quintile group to over 20 per cent in the last group, incumbent turnover was by comparison relatively constant, staying in the range from 15 to 19 per cent. Whatever industry characteristics determined the amount of entry and exit, they had very little affect on the amount of incumbent change.²⁰

Concentration measures have long provided the mainstay for those trying to characterize the structure of an industry. Their failings have been widely discussed. It is well-known that they provide only a partial picture of structure in that they capture the distribution of firms and not movements of firms within an industry. Two measures of mobility that overcome some of these difficulties have been presented here. Both yield important and different information. That they are not closely related confirms the criticism that has long been leveled at the concentration measure. There are a variety of changes taking place within industries and no single measure adequately summarizes these changes. Just as the concentration measure by itself is inadequate, so too is a simple measure of

A Comparison of the Sources of Turnover. Market Share Change Due to Entry and Exit versus Continuing Firm Growth and Decline : Long-run (1970-79)



Size Group

Figure 5

entry and exit or of incumbent mobility.

Conclusion

This paper has provided a basic description of turnover in continuing firms and compared it to entry and exit -- the other half of the turnover process. These two processes have quite different long- and short-run characteristics. Entrants as a class start small but then grow inexorably. Short-run estimates of the importance of entry then can all too easily lead to the false impression that entry and exit is insignificant. By way of contrast, exactly the opposite occurs for the continuing firm sector. Here growth and decline in the short run is large. But much of this is transitory. When measured over a decade, the annualized rate of change for the continuing sector is about one-fifth the rate yielded by yearly comparisons.

Some of the difference between the annualized long-run and the short-run rates of change in the continuing sector is due to transitory phenomena -- changes that are quickly reversed. However, part is due to the change in the composition of the continuing firm population associated with long-term structural change in the relative rankings of firms. For example, as the time period over which the measurement is taken is lengthened, there will be fewer incumbent firms to decline because more will have exited. Moreover, the remaining firms will be the more successful and will have lower decline rates. We might, therefore, expect the cumulative contraction rate to reach an asymptote and the annualized decline rate to approach zero.

The same conclusion also applies to the expanding segment, but for different reasons. Initially cumulative expansion should be high reflecting the growth opportunities for the younger more efficient firms that are expanding. But eventually as the period of measurement is lengthened, young firms become old and begin the process of decline. Cumulative growth will peak and then fall. The equivalent annual rates will approach zero.

Since, in the long-run, the equivalent annualized entry, exit, growth, and decline

rates all approach zero, interest must focus on the rapidity of the process. In this paper, only five and ten year periods have been used to measure the long-run effect. It is not sensible to project the ultimate time paths of growing and declining firms from two observations. Nevertheless, useful information can be provided by these statistics. They reveal the cumulative value of growth and contraction is significant. Over a decade, the entry and exit process contribute about the same amount of change as does the continuing sector. Together, they shift about a third of market share from gainers to losers over the period. These figures do not include the resources that are transferred from one firm to another as a result of take-overs and mergers. When the latter are also included, some 40 per cent of market share is reallocated on average. This is indicative of a large degree of mobility.

This paper has also found that the degree of turnover due to entry and exit does not correlate highly with the amount of incumbent turnover. Whatever industry characteristics determine the extent of external competition from entry and exit, they do not also appear to influence the amount of internal competition. The field of industrial organization has often devoted special attention to modeling the effect of entry. Implicit in these exercises is the notion that the disciplining influence exerted by entry is somehow different from internal pressures that come from incumbents. If entry and exit are just marginal manifestations of a general turnover process at work, then there is little need to treat them separately. That this is not the case reinforces the need to investigate further the determinants of entry and exit. It also emphasizes that there are several dimensions to the concept of mobility that need to be more fully delineated. These are considered at length in Baldwin and Gorecki (1989c).

REFERENCES

- Baldwin, J.R. and P.K. Gorecki, 1987. "Plant Creation versus Plant Acquisition: The Entry Process in Canadian Manufacturing," International Journal of Industrial Organization 5: 27-41.
- Baldwin, J.R. and P.K. Gorecki. 1989a. "Mergers Placed in the Context of Firm Turnover," Research Paper. Analytical Studies Branch. Statistics Canada. mimeo.
- Baldwin, J.R. and P.K. Gorecki. 1989b. "Dimension of Labour Market Change in Canada: Intersectoral Shifts, Job and Worker Turnover," Research Paper #25. Analytical Studies Branch. Statistics Canada.
- Baldwin, J.R. and P.K. Gorecki. 1989c. "Measuring the Dynamics of Market Structure," Annales d'Economie et de Statistique. No. 15/16.
- Baldwin, J.R. and P.K. Gorecki. 1990a. "Firm Entry and Exit in the Canadian Manufacturing Sector," Research Paper #23a. Analytical Studies Branch. Statistics Canada.
- Baldwin, J.R. and P.K. Gorecki. 1990b. "Measuring Entry and Exit to the Canadian Manufacturing Sector Using Longitudinal Data: Methodology," forthcoming in A.C. Singh, ed. Analysis of Data in Time, proceedings of a conference sponsored by Statistics Canada, Carleton and Ottawa University, fall 1989.
- Baldwin, J.R. and P.K. Gorecki. 1990c. Structural Change and the Adjustment Process: Perspectives on Firm Growth and Worker Turnover. Economic Council of Canada.
- Hall, B. 1987. "The Relationship between Firm Size and Firm Growth in the U.S. Manufacturing Sector," Journal of Industrial Economics. 35: 583-606.
- Hymer, S. and P. Pashigian. 1962. "Turnover of Firms as a Measure of Market Behaviour," Review of Economics and Statistics. 44: 82-87.
- Leonard, J. 1987. "In the Wrong Place at the Wrong Time: The Extent of Frictional Unemployment," in K. Lang and J. Leonard, eds. Unemployment and Structure of Labor Markets. Oxford: Basil Blackwell.
- Organization for Economic Cooperation and Development. 1987. "The Process of Job Creation and Job Destruction." Employment Outlook, 1987. Paris: OECD, pp. 97-220.

NOTES

1. See, for example, Baldwin and Gorecki (1987) and other papers in the 1987 issue of the International Journal of Industrial Organization that was devoted to entry and exit.
2. For a discussion of the difference between a consolidated firm defined at the level of the manufacturing sector as opposed to an unconsolidated firm defined at a 4-digit industry level, see Baldwin and Gorecki (1990b)
3. The consolidated firm consists of all establishments within manufacturing under common control.
4. See Baldwin and Gorecki (1990c) for further discussion of the relative volatility of the different components.
5. Firms that enter by building new plant are greenfield entrants; firms that enter by acquiring plant are entrants via acquisition.
6. Firms that exit by closing plant are termed closedown exits; firms that exit by divesting plant are termed divestiture exits.
7. See Baldwin and Gorecki (1990c) for a more extensive discussion of the characteristics of job turnover at the establishment level.
8. See Baldwin and Gorecki (1990a)
9. The equivalent annual rates are those rates which when compounded annually over the period equal the cumulative rates.
10. The OECD (1987) have suggested that the minimum values of short-run change be used as a proxy for the amount of long-run or structural change. The results reported herein suggest this is not always appropriate. The minimum value of the proportion of firms declining annually closely approximates the percentage that decline over longer periods. But the annualized longer-run decline rates are less than the lowest short-run contraction rates. It is best, therefore, to concentrate directly on long-run comparisons and not to infer long-run behavioural characteristics from short-run data.
11. See Baldwin and Gorecki (1989b).
12. Another reason for focusing on individual industries is that a multi-industry firm may remain the same overall but have its components at the individual industry level change substantially. If this were often the case, aggregate level data would underestimate change.
13. See Baldwin and Gorecki (1990b) for a discussion of the relevant data bases.
14. See Hymer and Pashigian (1962) for an early use of this index to measure instability in an industry.
15. Market share is calculated using shipments.
16. Entry and exit due to acquisition is not counted as an entry or exit in this version. Share changes in the firm that was acquired are included in the share change associated with continuing firms.
17. In this formulation, the share change for divested firms is set equal to 1970 share; for acquired firms, it is set equal to 1979 share.
18. The effect of mergers is dealt with in Baldwin and Gorecki (1989a)
19. See Baldwin and Gorecki (1990a)
20. The correlations were also performed within each of the quintile groups and no significant correlations were found.

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